

MATH127-001 200710 Problem Set 1

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Below are problems which are similar to problems that may appear on the next quiz or test. You do not have to hand these problems in, but I suggest you try to solve them so that you will be prepared for the test.

I have also included some suggestions for projects you can do for group work assignments. I think I would like to set aside time for presentations of group work; we can discuss the issue during our next class.

1. I have in mind two numbers. Their sum is 57 and their difference is 29. What are the numbers? How can you use linear algebra to find out?
2. I have a line with equation $2x - y = 1$ and you have a line with equation $-x + 3y = 12$. The secret number is in the x -coordinate of the intersection. What is the secret number?
3. I have in my pocket 14 coins all of which are nickels and dimes. The value of the coins is \$1.15. How many nickels do I have and how many dimes?
4. Suppose that each of you has a plane in space passing through a point with an important secret number stored in the x -coordinate. What might happen if two of you have the same plane?
5. I have in my pocket 15 coins, all of which are pennies, nickels, and dimes. The total value of the coins is \$0.58. Can you tell me how many of each kind I have? What are the possibilities?
6. (Project.) I have nine rooms in my house arranged in a 3×3 grid. Every time I toggle a light switch in one of the rooms, not only does it change the state of that room, but it toggles the state of the lights in all adjacent rooms. Suppose initially all lights are on. Which switches do I have to toggle to shut all the lights off? Prove that your answer is correct and that you have all possible answers to the problem.
7. (Project.) Similar to the previous, but instead of initially having all lights on, I have
8. (Project.) Similar to the previous, but I have a 3×2 grid. Can you think of a way to find all initial configurations for which there is not a solution?

You should also try the following problems from the textbook.

- 2.1 C-level: 1–34; B-level: 43–45, 47–49, 51–58 (solve the systems); A-level: 60–68 (solve the systems);
- 2.2 C-level: 1–10, 13–23, 25–30, 31–48; B-level: 49–58; A-level: 59–64, 71–75;
- 2.3 C-level: 1–50; B-level: 51–58; A-level: 59–85;